

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

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Applicant's or agent's file reference BP01 9874 Cog	FOR FURTHER ACTION		See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA416)
International application No. PCT/GB 03/01752	International filing date (day/month/year) 24.04.2003	Priority date (day/month/year) 26.04.2002	
International Patent Classification (IPC) or both national classification and IPC C10G25/00			
Applicant BP OIL INTERNATIONAL LIMITED			

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 10 sheets, including this cover sheet.



☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

 These annexes consist of a total of sheets.

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19. 11. 2004

3. This report contains indications relating to the following items:
 - I ☒ Basis of the opinion
 - II ☐ Priority
 - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☒ Lack of unity of invention
 - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain documents cited
 - VII ☐ Certain defects in the international application
 - VIII ☐ Certain observations on the international application

Date of submission of the demand 17.11.2003	Date of completion of this report 02.09.2004
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer Savage, J Telephone No. +31 70 340-2482 

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I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-21 as originally filed

Claims, Numbers

1-46 as originally filed

Drawings, Sheets

1/11-11/11 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

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5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees, the applicant has:

- ☐ restricted the claims.
☒ paid additional fees.
☐ paid additional fees under protest.
☐ neither restricted nor paid additional fees.

2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- ☐ complied with.
☒ not complied with for the following reasons:

see separate sheet

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

- ☒ all parts.
☐ the parts relating to claims Nos. .

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	2,4-14,19-34,40-46
	No: Claims	1,3,15-18,35-39
Inventive step (IS)	Yes: Claims	4-14,40-43
	No: Claims	1-3,15-39,44-46
Industrial applicability (IA)	Yes: Claims	1-46
	No: Claims	

2. Citations and explanations

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see separate sheet

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Reference is made to the following documents:

- D1: US-A-3 446 729 (YEVICH JOSEPH P ET AL) 27 May 1969 (1969-05-27)
- D2: US-A-2 763 603 (SKINNER DAVIS A) 18 September 1956 (1956-09-18)
- D3: "PYRROLE NITROGEN IN PETROLEUM DISTILLATES BY VISIBLE SPECTROPHOTOMETRY UOP METHOD 276-85" ANNUAL BOOK OF ASTM STANDARDS, PHILADELPHIA, PA, US, 1985, pages 1-5, XP001164293 ISSN: 0192-2998
- D4: WO 91/05242 A (COMMW OF AUSTRALIA ;SECR DEFENCE BRIT (GB)) 18 April 1991 (1991-04-18)
- D5: US-A-4 203 725 (SNOWDEN ESTHER A ET AL) 20 May 1980 (1980-05-20)
- D6: DE 44 24 712 A (BASF AG) 18 January 1996 (1996-01-18)
- D7: "Standard Test Method for Thermal Oxidation Stability of Aviation Turbine Fuels (JFTOT Procedure) D 3241" ANNUAL BOOK OF ASTM STANDARDS, vol. 05.02, 1997, pages 355-365, XP002263895 Philadelphia, PA, US

Re Item IV

Lack of unity of invention

- 1 This Authority considers that there are 3 inventions covered by the claims indicated as follows:
 - I: Claims 1-20: method for improving the thermal stability of a distillate fuel.
 - II: Claims 21-34: method and apparatus for determining the thermal stability of a distillate fuel using colorimetric analysis.
 - III: Claims 35-46: Calibration fluid comprising a known concentration of N-H containing heterocyclic aromatic compounds.
- 2 The reasons for which the inventions are not so linked as to form a single general inventive concept, as required by Rule 13.1 PCT, are as follows:
 - 2.1 Apart from the trivial "distillate fuel", there is no common or corresponding technical feature between claim 1 (a method of treatment of a hydrocarbon) on one hand and claims 21 and 32 (a test method and apparatus) on the other.
 - 2.2 The common or corresponding technical feature between claim 1 and claims 35, 44 and 46 is a fluid comprising a known concentration of N-H containing heterocyclic aromatic compounds in which the nitrogen atom of the N-H group is part of the aromatic system and/or a known concentration of metal compounds,

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and a hydrocarbon phase. This feature is however already known from D1 (see example 7).

- 2.3 Therefore this feature is not a special technical feature. This no common or corresponding special technical features can be found between independent claims 1 and the group of independent claims 35,44 and 46 as required by Rule 13.2 PCT.
- 3 The independent claims can be grouped according to their special technical features apart from said known concepts:
- I: Claims 1-20, directed to a method for improving the thermal stability of a distillate fuel which comprises selectively reducing the concentration of N-H containing heterocyclic aromatic compounds in which the nitrogen atom of the N-H group is part of the aromatic system and wherein said fuel also contains a concentration of metal compounds.
 - II: Claims 21-34, directed to a test method and apparatus for determining the thermal stability of a distillate fuel using colorimetric analysis.
 - III: Claims 35-46, directed to a calibration fluid comprising a known concentration of N-H containing heterocyclic aromatic compounds in which the nitrogen atom of the N-H group is part of the aromatic system and/or a known concentration of metal compounds, and a hydrocarbon phase.
- 4 There is no feature common to the three inventions, which could be considered a special technical feature within the meaning of Rule 13.2 PCT, second sentence. Thus no technical relationship can be seen between the two inventions.

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Invention I:

- 5 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1 is not new in the sense of Article 33(2) PCT.

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- 5.1 Document D1 discloses (see cl. 1 and 8) a method for improving the thermal stability of a distillate fuel which comprises selectively reducing the concentration of N-H containing heterocyclic aromatic compounds in which the nitrogen atom of the N-H group is part of the aromatic system and wherein said fuel also contains a concentration of metal compounds. See also document D2, Col. 4, para. 3-5. The subject-matter of claim 1 can therefore not be considered as new in the sense of Article 33(2) PCT.
- 5.2 Dependent claims 3 and 15-18 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty, see documents D1 and D2 and the corresponding passages cited in the search report.
- 5.3 Claim 2 does not meet the requirements of Article 6 PCT in the matter for which protection is sought is not clearly defined. The claim attempts to define the subject-matter in terms of the result to be achieved which merely amounts to statement of the underlying problem and as such can not be seen as novel and inventive over the prior art in the sense of Article 33(2) and (3) PCT.
- 5.4 From the text of the description of the present application, the subject-matter of dependent claims 19 and 20 does not contribute to solving the technical problem posed in the application. Therefore it does not involve an inventive step in the sense of Article 33(3) PCT.
- 5.5 The subject-matter of dependent claims 4-14 is neither known from, nor rendered obvious by, the available prior art.

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Invention II:

- 6 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 21 does not involve an inventive step in the sense of Article 33(3) PCT.
- 6.1 The document D4 is regarded as being the closest prior art to the subject-matter of claim 21, and discloses (the references in parentheses applying to this document) a test method for determining the thermal stability of a distillate fuel (see for example page 1, lines 16-17) in which the fuel is contacted with a solvent which is at least partially immiscible with said fuel to form an oil-immiscible layer and relating the visible colour and/or colorimetric absorbency between 400 and 700 nm of said oil-immiscible layer to the thermal stability of the fuel (page 7, lines 30-37).
- 6.2 The subject-matter of claim 21 therefore differs from this known test method in that 4-aminobenzaldehyde in formic acid is used as the at least partially immiscible solvent. The problem to be solved by the present invention may therefore be regarded as the choice of a suitable partially immiscible acid catalyst for the test.
- 6.3 The solution proposed in claim 21 of the present application cannot be considered as involving an inventive step (Article 33(3) PCT) for the following reasons. Document D4 teaches that the oil should be contacted with an oxidising agent and an acid which should be at least partially soluble in the oil. Formic acid is merely one of several straightforward possibilities from which the skilled person would select, in accordance with circumstances, without the exercise of inventive skill, in order to solve the problem posed. Furthermore, the use of aminobenzaldehyde is known from document D3 and D6 for example.
- 6.4 The same reasoning applies, mutatis mutandis, to the subject-matter of the corresponding independent claim 32, which therefore is also considered not inventive.
- 6.5 Dependent claims 22-31, 33 and 34 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step, see documents D3 and D4

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and the corresponding passages cited in the search report.

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Invention III:

- 7 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 35 is not new in the sense of Article 33(2) PCT.
- 7.1 The document D1 discloses a fluid suitable for use as a calibration fluid comprising a known concentration of N-H containing heterocyclic aromatic compounds in which the nitrogen atom of the N-H group is part of the aromatic system and/or a known concentration of metal compounds, and a hydrocarbon phase (see example 7). See also Document D6, claim 4.
- 7.2 The subject-matter of the corresponding independent claims 44 and 46 disclose merely the idea of calibrating a test apparatus using the (known) calibration fluid of claim 35. Calibration of test apparatus is however generally known to the person skilled in the art, see for example D7 (page 359, para A1.9) and therefore the subject-matter of claims 44 and 46 cannot be seen as inventive in the sense of Article 33(3) PCT.
- 7.3 Dependent claims 36-39 and 45 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step, see documents D1 and D7 and the corresponding passages cited in the search report.
- 7.4 The combination of the features of dependent claims 40-43 is neither known from, nor rendered obvious by, the available prior art.